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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,716	08/28/2001	Kazushige Yonenaga	011070	2708

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EXAMINER	
LEUNG, WAI LUN	
ART UNIT	**PAPER NUMBER**
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/939,716	YONENAGA ET AL.	
	Examiner	Art Unit	
	Wai Lun Leung	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-17 and 19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-15 and 19* is/are rejected.

7)☒ Claim(s) *16 and 17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/14/2007 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Furthermore, the key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR International Co. v. Teleflex Inc.* note that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting *In re Kahn* 441 F.3d977,988,78 USPQ2d1329,1336(Fed.Cir.2006) stated that "[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness."

3. Claims 10-17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Yonenaga et al.** *(US005543952A)*, in view of **Chung et al.** *(XP000227527) ""Modeling and Optimization of Traveling-Wave LiNbO3 Interferometric Modulators", IEEE Journal of Quantum Electronics, Vol 27, No 3, March 1991.*

Regarding claim 10, **Yonenaga** discloses an optical transmitter *(fig 1b)* comprising:

an input terminal for accepting an electrical binary signal *(col 3, ln 34-35)*,

an electrical-optical conversion means for converting an electrical signal to an optical signal *(col 3, ln 37-45)* ,

said electrical-optical conversion means having a traveling wave type electrode operating to restrict bandwidth of an output light of said electrical-optical conversion means *(col 8, ln 4-9)* , wherein said electrical-optical conversion means is a Mach Zehnder light intensity modulator having a traveling wave type electrode *(col 8, ln 21-39)*,

a precoding means *(fig 1B, 80)* provides an output which is the same as the previous output when an input binary digital serial is 0, and an output which differs from the previous output when an input digital signal is 1 *(fig 10, Data signal as input, precoded signal is the output)* , and

said traveling wave type electrode *(fig 1B, 70)* is designed so that phase change of optical wave propagating in said optical waveguide depending upon said electrical field has waveforms of a ternary duobinary signal *(fig 12F)* .

Yonenaga does not disclose expressly the bandwidth restriction procedures of said Mach Zehnder light intensity modulator in detail. **Chung**, from the same field of endeavor, teaches a Mach Zehnder Light intensity modulator, being operated as an electrical-optical conversion

means *(col 1, page 608)*, having a traveling wave type electrode *(page 612, section III)*, bandwidth of optical output of said Mach Zehnder light intensity modulator is restricted because of loss of said traveling wave type electrode *(page 613, sections A describes relationships between loss of traveling wave type electrode and its bandwidth; section B describes its parameters being used to drive the modulator)* and by using mismatching of phase velocity of electric wave propagating on said traveling wave type electrode *(col 2, page 614 discuss the relationship between velocity mismatch, power requirement, and other parameters relative to bandwidth; fig 6 further illustrates such numerical procedures to define bandwidth)* and optical wave propagating in an optical waveguide having refractive index depending upon electrical field generated by an electric wave *(fig 2 a & b illustrate the variation of refractive index depending on electrical field generated by the electric wave, an inherent property of MZ-modulator)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to implement Chung's technique to restrict bandwidth of optical output of said Mach Zehnder light intensity modulator by using loss of said traveling wave type electrode and by using mismatching of phase velocity of electric wave propagating on said traveling wave type electrode and optical wave propagating in an optical waveguide having refractive index depending upon electrical field generated by said electric wave, onto **Yonenaga**' system as suggested by **Chung**. The motivation for doing so would have been to be able to simplify optimization procedures by determining the set of parameters that will satisfy the given bandwidth requirement to restrict bandwidth of optical output of said Mach Zehnder light intensity modulator by using loss of said traveling wave type electrode *(Chang, page 616, section V)*.

Furthermore, it would have been obvious for a person of ordinary skill in the art at the time when the invention was made to recognize the known improvement technique such as that of **Chung's** could have applied in the same way to **Yonenaga's** base device and the results of bandwidth limitations would have been predictable to one of ordinary skill in the art. Therefore, the rationale of use of known technique (**Chung's**) to improve similar methods (**Yonenaga's**) in the same way has been clearly articulated herein with the *Graham* inquiries and findings as presented above. *In re Nilssen* 851 F.2d 1401, 7 USPQ 2d 1500 (Fed.Cir.1988) at 1403, 7 USPQ2d at 1502, the court found "it would have been obvious to one of ordinary skill in the art to use the threshold signal produced in the USSR device to actuate a cutoff switch to render the inverter inoperative as taught by Kammiller." That is, using the known technique of a cut off switch for protecting a circuit to provide the protection desired in the inverter circuit of the USSR document would have been obvious to one of ordinary skill.

The combination of Yonenaga and Chung does not disclose expressly an amplifier for amplifying an input signal applied to said input terminal to level requested for operating said electrical-optical conversion means, and applying the amplified electrical signal to said electrical-optical conversion means, and wherein the precoding means is provided at an input stage of said amplifier. However, Examiner takes official notice that it is common and well known to place an amplifier along a transmission medium in order to restore signal strength. As it is well recognized that signal degrade as they travel through a transmission medium, it would have been obvious for a person of ordinary skill in the art at the time when the invention was made to put amplifiers along any points of a transmission system or medium, such as at said input terminal to level requested for operating said electrical-optical conversion means, and/or at

the output stage of the precoding means. The motivation for doing so would have been to have enough signal strength to operate the system.

As to claim 11, **Yonenaga** further teaches wherein said electrical-optical conversion means provides the maximum level of optical output for an input electrical signal having the maximum level and the minimum level *(first electrical input "0" and 3rd electrical input "2" as shown in fig 12D, result in a maximum level of optical output "intensity 1" as shown in fig 12F)*, the minimum level of optical output for an input electrical signal having middle level between said maximum level and said minimum level *(2nd electrical input "1" as shown in fig 12D, result in a minimum level of optical output "intensity 0" as shown in fig 12F)*, and optical phase relating to said maximum level of said optical signal is opposite of optical phase relating to said minimum level of said optical signal *(fig 12F shows "π" and "0" as the respective phase, which are opposite)*.

As to claim 12, **Yonenaga** further teaches wherein said electrical-optical conversion means is a Mach Zehnder Light intensity modulator *(70, fig 1B)* having a pair of electrodes *(74a & b, fig 1B)*, and electrical signals applied to each electrodes are binary signals having opposite polarities with each other *(note that inverter 11, fig 1B makes the electrical signals having opposite polarities with each other, these signals are also illustrated in fig 12A & 12B)*. **Chung** further teaches each of the electrodes in a Mach Zehnder Light intensity modulator is a traveling wave type electrode having bandwidth restriction property *(page 613, sections A describes relationships between loss of traveling wave type electrode and its bandwidth; section B describes its parameters being used to drive the modulator)*.

As to claim 14, **Chung** further teaches wherein said Mach Zehnder Light intensity modulator is provided on a substrate of Z-cut Lithium-Niobate *(col 2, page 608)*.

As to claims 15 and 19, **Chung** further teaches wherein said Mach Zehnder light intensity modulator is provided on a substrate of X-cut Lithium-Niobate *(col 2, page 608)*.

4. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Yonenaga et al.** *(US005543952A)*, in view of **Chung et al.** *(XP000227527) ""Modeling and Optimization of Traveling-Wave LiNbO3 Interferometric Modulators", IEEE Journal of Quantum Electronics, Vol 27, No 3, March 1991.* , as applied to claim 10 above, and further in view of **Tocci** *(US005271074A)*.

Regarding claim 13, **the combination of Yonenaga and Chung** discloses the optical transmitter in accordance to claim 10 as discussed above. **It** does not disclose expressly wherein traveling direction of said electrical signal in said electrode is opposite to traveling direction of optical signal in said optical waveguide. **Tocci**, from the same field of endeavor, teaches an optical transmitter wherein traveling direction of an electrical signal in its electrode is opposite to traveling direction of optical signal in its optical waveguide *(fig 5 illustrates the traveling direction of an electrical signal is from right to left, while the optical signal is from left to right)*. With a finding that at the time of the invention, that the scope and content of the prior art, whether in the same of different field of endeavor as that of the applicant's invention or a different field of endeavor, included a similar or analogous device *(**Tocci**, (fig 5, wave guide modulator))*; a finding that there were design incentives or market forces which would have prompted adaptation of the known device *(**Tocci**, (col 9, ln 17-col 11, ln 25))*; a finding that the differences between the claimed invention and the prior art were encompassed in known

variations or in a principle known in the prior art *(**Tocci**, (col 9, ln 58-col 10, ln 40))*; and a finding that one of ordinary skill in the art, in view of the design incentives or market forces, could have implemented the claimed variation of the prior art, and the claimed variation would have been predictable *(**Tocci**, (col 10, ln 30-68))*. Therefore, the rational to support a conclusion that the claim would have been obvious has been clearly articulated in that design incentives or other market forces could have prompted one of ordinary skill in the art to vary the prior art in a predictable manner to result in the claimed inventions. In *KSR*, 550 U.S. 82 USPQ 2d at 1385.

Response to Arguments

5. Applicant's arguments with respect to claims 10-17 and 19 have been considered but are moot in view of the new ground(s) of rejection.

The Official Notice, as presented in the Office action, paper number 20061130, concerning it is common and well known to place an amplifier along a transmission medium in order to restore signal strength. As it is well recognized that signals degrade as they travel through a transmission medium, it would have been obvious to put amplifiers along any points of a transmission system or medium, such as at the input of **Yonenaga's** electrical-optical conversion means or bandwidth restriction means, in order to restore signal strength, so that **Yonenaga's** input signal has enough level for operating said electrical-optical conversion means is maintained.

*US Patent Number 6,415,003 to **Raghavan**, US Patent Number 6,556,328 to **Tanaka**, and US Patent Number 6,728,277 to **Wilson** are all individually cited herein as evidence to support examiner's taking of Official Notice.*

In col 6, ln 16-22, ***Raghavan*** *clearly teaches that one of ordinary skill in the art will recognize that amplifier may be located anywhere in an apparatus where signal amplification is needed.*

In fig 1, ***Tanaka*** *illustrates having an amplifier (9) for amplifying an input signal (Es) of an electrical-optical conversion means (LD1), and a bandwidth restriction means (BPF1) locates between an output of said amplifier (9) and an input of said electrical conversion means (LD1).*

In fig 2, ***Wilson*** *illustrates having an amplifier (DC coupled) for amplifying an input signal (Ve) of an electrical-optical conversion means (12), and a bandwidth restriction means (LPF 26) locates between an output of said amplifier (DC coupled) and an input of said electrical conversion means (12).*

In fig 2, ***Wilson*** *illustrates providing a precoding means (18) at an input stage of an amplifier (DC coupled).*

Allowable Subject Matter

6. Claims 16 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. The prior art made of record in previous actions and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai Lun Leung whose telephone number is (571) 272-5504. The examiner can normally be reached on 11:30am-9:00pm Mon-Thur.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DWL
November 8, 2007

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